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PERT AND CPM: A Selected Bibliography

Maribeth Brennan, Librarian, Barton-Aschman Associates, Inc.,
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I. INTRODUCTION

Program Evaluation Review Technique (PERT) and Critical Path Method (CPM) are both planning techniques of critical path analysis. These management tools rely on arrow and node diagrams of "activities" and "events": arrows represent the "activities" or work necessary to reach the "events" or nodes that indicate each completed phase of the total project. (See sample diagram at the end of the Introduction.) The distinction between PERT and CPM is essentially this: CPM employs one time estimate and one cost estimate for each activity; PERT may utilize three time estimates (optimistic, expected, and pessimistic) and no costs for each activity. Although these are distinct differences, the term PERT is applied increasingly to all critical path scheduling. Originally, this was intended to be a bibliography on PERT only; however, since the distinction between PERT and CPM is often not defined, both methods are included.

PERT originated in 1958 with the National Aeronautics and Space Administration's (NASA's) Polaris missile design and construction scheduling. Since that time, it has been used extensively not only by the aerospace industry but also in many situations where management desires to achieve an objective or complete a task within a scheduled time and cost expenditure; it came into popularity when the algorithm for calculating a maximum value path was conceived. PERT and CPM may be calculated manually or with a computer, but usually they require major computer support for detailed projects. A number of colleges and universities now offer instructional courses in both.

In addition to urban planning and transportation projects, PERT/CPM is applied to building construction projects, highway maintenance and construction projects, public financing, accounting and billing procedures, various research projects and, most recently, to the research and development of new products. It is in these areas that its application is the most beneficial.

The usefulness of PERT/CPM analysis to urban planning and transportation projects is debatable. Although Barton-Aschman Associates, Inc., has used PERT/CPM on various transportation studies and general neighborhood renewal projects with success, some questions that have been raised about the technique are: Is PERT/CPM really a time-saver or does the translation into PERT language involve an intricate

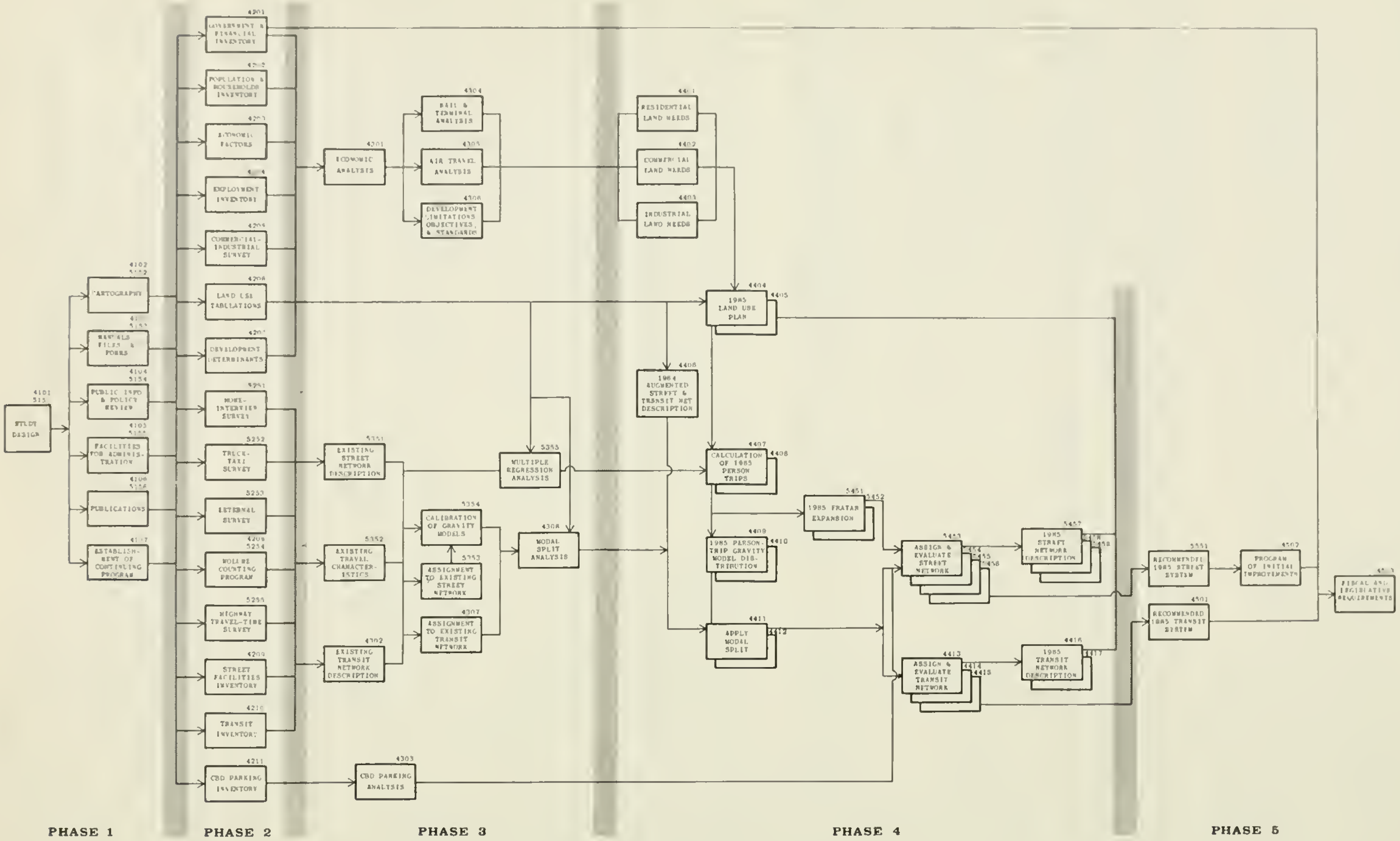
extra step in the planning process while introducing more possibilities for error? Although the initial program can be clocked, is it really possible to predict accurately the duration of continuing planning and transportation processes?

In evaluating PERT's usefulness, mention should be made of "Project Control" or "Precedence List". This is a more recent form of critical path analysis in which emphasis on "activities" and "events" is reversed, i.e., in Project Control's arrow diagram, the arrow indicates each completed phase or goal, while the node represents the "activity" or work needed to attain each end. Since this is basically the preliminary step in PERTing a project, it is a time-saving method which eliminates the conversion into PERT.

It is not the function of a bibliography to draw a conclusion. However, one should keep in mind that PERT is only one of many management techniques, and that, in time, it can be adapted to other needs, and perhaps modified and/or replaced by newer methods. Its application to transportation and urban planning may diminish in the light of more advanced techniques. Currently, its real value lies in construction project planning and control and new products research. The greatest benefit is derived from forcing the study's personnel to define each event carefully.

The following limitations were placed on the bibliography: (1) references to additional critical path analyses, such as RAMPS, LESS, etc., are excluded; (2) only five references to PERT/Cost are given; (3) the bibliography includes only a minimum of material produced by NASA, the Department of the Navy, and the Department of Defense--this is readily available through the government agencies and is not essential here; and (4) many of the handbooks from IBM and various government agencies are excluded from the section on Manuals and Programmed Instructions; the listed works are sufficient for a basic introduction to PERT/CPM. Inevitably, some references fall under several categories. In these instances, the most appropriate subject heading was chosen and no reference is listed twice. It is hoped that this bibliography will be useful both to the layman and the more advanced PERT user.

The references in this bibliography are not available on loan from the Barton-Aschman library.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